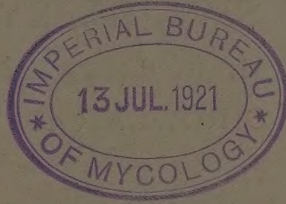


~~FLORA W. PATTERSON.~~

COMMON DISEASES OF THE PEACH, PLUM AND CHERRY. ~~X~~

Mel. T. Cook.

INDEXED. PATH. COLL.



NEW JERSEY
AGRICULTURAL
Experiment Stations
CIRCULAR 45

New Brunswick, N. J.

NEW JERSEY

AGRICULTURAL EXPERIMENT STATIONS

CIRCULAR 45

Common Diseases of the Peach, Plum and Cherry.*

This circular is intended to familiarize the fruit growers of the state with the most common diseases of the drupaceous fruits and the latest and most satisfactory treatments. Some of these diseases are very injurious, some are of little importance, while others vary in severity from year to year. All parts of the tree; root, trunk, branch, foliage, flowers and fruits, are subject to the attack

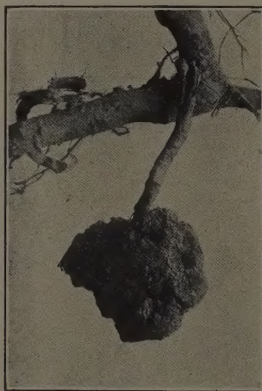


Fig. 1. *Crown Gall on Cherry.*

(From Circular 34, New Jersey Agricultural Experiment Station)

of fungus and bacterial pests and must be given careful attention. Sometimes the disease of one part makes itself manifest in another part of the tree. The time to begin combatting these pests is in the selection of the tree. Give careful attention to the setting,

* Prepared by Mel. T. Cook, Ph.D., Plant Pathologist, New Jersey Experiment Station.

cultivation and fertilization; and give the recognized spray treatments for the control of the fungus diseases.

CROWN GALL (*Pseudomonas tumefaciens* S. & T.) (Fig. 1.) This disease is due to bacteria which cause irregular, more or less spherical, swellings at the crown and on the roots of the tree and sometimes above ground. Trees affected with this disease are likely to be weaker than healthy trees, to be more subject to other pests, to require more fertilizer, and to be injured by wind storms. The disease also occurs on apple, pear, quince, plum, cherry, raspberry, blackberry, rose, grape, poplar, willow, daisy, and many other plants. It is most severe on red raspberries. *Do not set trees showing this disease. Cutting off the diseased part is not a satisfactory remedy. Never use raspberries or blackberries as inter-row crops in the peach orchard.* The setting of peach, plum or cherry orchards on old raspberry fields is a very bad practice and likely to result in losses. Root galls may be due to other causes.



Fig. 2. *Leaf Curl on Peach. Affected leaves on left and healthy twig on right.*

(From 1913 Report, New Jersey Agricultural Experiment Station)



Fig. 3. *Brown Rot of the Peach.*
(From 1907 Report, New Jersey Agricultural Experiment Station)

LEAF CURL (*Exoascus deformans* (Berk) (Fckl.) (Fig. 2.) This very prevalent fungus disease occurs in the spring or early summer. The leaves are more or less curled and pouched and are frequently tinted with red and yellow. The affected leaves fall. If the loss of foliage is great, the tree will be weakened, and, although it will produce a new crop of leaves, it will bear little or no fruit. This disease can be easily controlled by spraying with lime-sulphur just before the opening of the buds.

PLUM POCKETS (*Exoascus pruni* Fckl.). This is a very similar disease of the plum which attacks the fruits, causing them to become soft and bladdery in character. It can be controlled by cutting out and burning the affected parts. It is not severe in New Jersey.

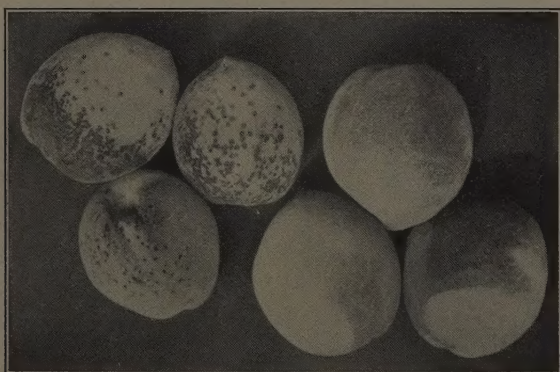


Fig. 4. *Peach Scab.* Scabby fruit on left and normal fruit on right.

(From 1913 Report, New Jersey Agricultural Experiment Station. Photograph by Professor Blake)

BROWN ROT (*Sclerotinia cinerea* (Bon.) Schroet). (Fig. 3.) This is the most destructive of the peach, plum and cherry diseases. It attacks the fruit when near maturity, causing it to decay. The surface of the fruit is gradually covered with a grayish brown growth of the fungus. Many affected fruits dry and cling to the tree throughout the winter. The disease may also attack the blossoms, causing them to die and turn brown. This condition is frequently mistaken as being due to a late frost. The disease also attacks the twigs and smaller branches, causing cankers which are

very detrimental to the general health of the tree. This disease can be controlled by the regular spraying methods.

PEACH SCAB (*Cladosporium carpophilum* Thuem.). (Fig. 4.) This disease is fully as prevalent as the brown rot but not so destructive nor so well known by the growers. It appears as black spots, or blotches, on the surface of the peach which is most exposed to the sun. When severe, it causes a dwarfing and hardening of the part affected and frequently a cracking. Even a mild form of the disease will reduce the market value of the fruit. It can be easily controlled by the regular spraying methods.



Fig. 5. *Bacterial Shot Hole of the Peach.*

(Photograph by Professor Blake)

BACTERIAL SHOT HOLE (*Bacterium pruni* E. F. S.). (Figs. 5, 6, 7.) This disease has given considerable trouble in South Jersey, especially on the Elberta. The first indication of the disease is a falling of the leaves, which show more or less purplish brown spots

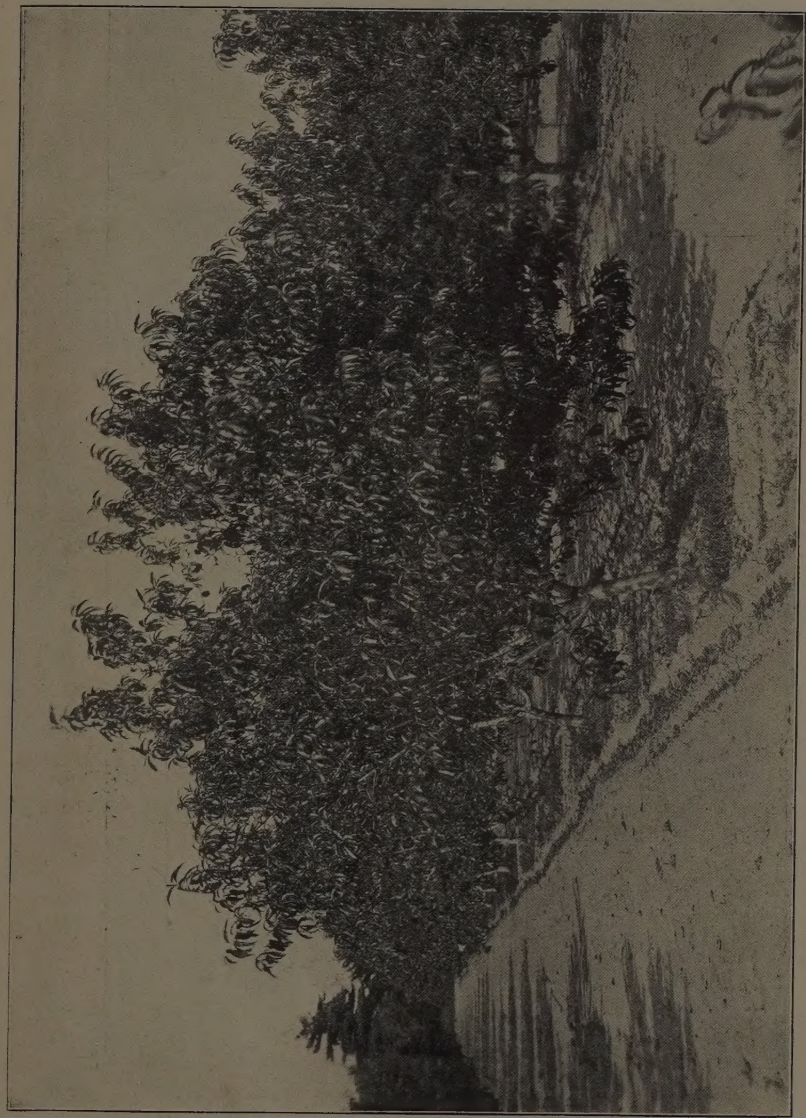


Fig. 6. *Bacterial Shot Hole of the Peach.* Note fallen leaves.
(Photograph by Professor Blake)

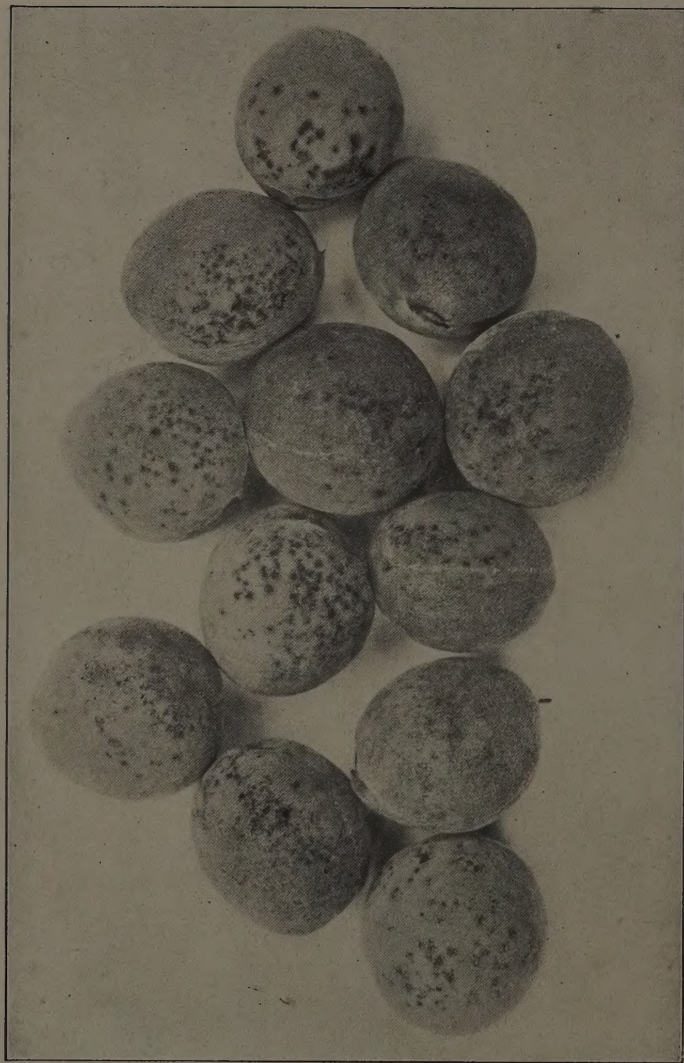


Fig. 7. *Bacterial Shot Hole Fungus on the Peach.*
(Photograph by Professor Blake)

which unite. Openings in these spots give the "shot hole" effect. Trees are frequently defoliated and the new growth killed. On the fruit it causes small, purplish spots, followed by small cracks in the skin. It bears a superficial resemblance to scab, but can be readily identified. There is no known treatment for the control of this disease.

This organism also attacks the plum. On the fruit, it causes very dark depressed spots followed by decay.

OTHER SHOT HOLES (*Cercospora circumscissa* Sacc. and *Phyllosticta circumscissa* Cke.). Other shot holes due to fungi are more or less prevalent in the peach orchards of the state, but are of very little importance in orchards which receive the proper cultivation and spraying. *C. circumscissa* also attacks the cherry.

LEAF SPOT (*Cylindrosporium padi* Karst). This fungus attacks the foliage of the cherry and plum, causing peculiar brown spots. When severe, the leaves turn yellow and fall. In very severe cases the trees may be defoliated. It is the cause of very heavy losses in both nursery and orchard. It can be controlled by spraying with self-boiled lime-sulphur after gathering the fruit.

MILDEW (*Podosphaeria oxycanthae* (D.C.) DeBy). This mildew attacks the foliage of the peach, plum, cherry, and also the apple, covering the young growths with the delicate white, powdery mycelium and spores. It is especially injurious on nursery stock. It can be readily controlled by the regular spray treatment.

BLACK KNOT (*Plowrightia morbosa* (Schw.) Sacc. (Fig. 8.) This disease of the plum and cherry causes black irregular knots on the branches. When young these knots are olivaceous, but eventually become black and somewhat like charcoal. This disease is especially severe on the plum. Cut out and burn the knots and give the regular spray treatment.

YELLOW (Cause undetermined). (Figs. 9, 10.) This well known and very destructive disease is prevalent throughout the state. It was first recorded about 1791 in the Delaware River valley, but is now widely distributed throughout a considerable part of the United States. It is not always easily detected, especially in its early stages and in young trees. In bearing trees the symptoms are (a) premature ripening of the fruit (Fig. 9), (b) a willowy growth of new shoots upon the trunk or main branches (Fig. 10), and (c) discoloration of the foliage. The *premature ripening* may occur before either of the other symptoms, and such fruit always



Fig. 8. *Black Knot of the Plum.*
(Circular 35, New Jersey Agricultural Experiment Station)



Fig. 9. *Peach Yellows.* 1 & 3 affected with yellows, 2 normal.
(Bulletin 226, New Jersey Agricultural Experiment Station)



Fig. 10. *Peach Yellows*.
(Bulletin 226, New Jersey Agricultural Experiment Station)

shows a red spotting or blotching over the surface or through the flesh. It is usually watery and insipid and sometimes quite bitter. Prematuring may also be due to girdling by borers, to binding by label wire, winter injury and other causes, some of which cannot be determined except by careful examination. The so-called *willow-ing* is very easily recognized and is familiar to most growers. It occurs as slender, sometimes clustered, yellowish-green shoots on the trunk and lower branches. The leaves on these shoots are small, narrow and also greenish-yellow. The foliage of the diseased tree is frequently of a yellowish-green color, but, if supplied with an abundance of nitrogenous fertilizer, may be a bright green. The disease may be noticeable in one part of the tree, while the remaining part may appear perfectly healthy. However, the apparently healthy part is affected and in due time will show the true characters of the disease.

Although the cause of peach yellows has not been determined it is well known that the disease can be transmitted from tree to tree by budding and otherwise. The fact that the disease can be easily transmitted in this manner makes nursery stock a dangerous source of distribution unless the greatest care is used in the selection of bud wood. There is considerable evidence to indicate that the disease has been frequently distributed on nursery stock. The appearance of the disease during the first, second or third summer on trees from certain nurseries while trees of the same variety from other nurseries were perfectly healthy indicates that the trees must have been diseased before they left the nursery. Prof. M. A. Blake of our New Jersey Agricultural Experiment Station describes the disease on young trees as follows: "If the leaves of one branch of such a tree begin to turn a yellowish-green or have a reddish, rusty green appearance and roll from the edges, it indicates a checking of the growth of the branch. If no insect or mechanical injury has occurred to the branch it strongly indicates yellows. The leaves upon such a branch ripen early and fall while the remainder of the tree retains most of its foliage. The fruit buds will be larger and further advanced upon the affected part and the bark will have a riper appearance with noticeably larger lenticles. The change in the behavior of any part of a well cultivated young peach tree does not usually occur until August in New Jersey and sometimes not until September." A young tree may also first show symptoms of disease by a drooping of the foliage toward the branches and

trunk, together with a change in the color of the foliage from a dark green to a light or even yellowish green. The affected leaves are also of a decidedly stiff and ripened texture as compared to normal leaves. These symptoms are quite characteristic and can be readily distinguished when once known.

There is no cure for yellows other than the cutting and burning of the diseased trees. The diseased trees should not touch the healthy trees. New trees can be planted in the same place as the old ones; the disease does not persist in the soil and is not transmitted through it.

LITTLE PEACH. This disease is of comparatively recent origin, is similar to yellows, and its cause is also unknown. It is as widely distributed as yellows and equally as destructive. The fruit is small, ripens late, is inferior in quality and frequently insipid and watery. The leaves are frequently lighter green than normal leaves and may be yellowish-green and are often rolled and drooping. This disease can probably be distributed through nursery stock and, therefore, great care should be used in the selection of bud wood and young trees. Diseased trees must be treated in the same manner as for yellows.

SIMILAR DISEASES ON OTHER PLANTS. A number of other related plants, such as plum, cherry, apricot and raspberry, are affected with similar diseases, which are probably due to the same causes, although we have no positive proof. Yellows of plum and little plum are becoming more and more abundant and are demanding more and more attention from persons interested in the fruit industries.

Treatments. The treatments for "yellows" and "little peach" are the same. Nurserymen and all others who make a business of budding trees should use the greatest care possible in selecting both seedlings and bud wood. The fact that the disease is difficult to detect in nursery stock makes this all the more important. Very few fruit growers and nurserymen are familiar with the appearance of trees in the early stages of these diseases. Wood from the apparently healthy part of a slightly diseased tree will carry the disease. When once introduced into a nursery, it is readily transmitted by the common practice of budding from row to row. In this way the most honest and careful nurseryman may unknowingly distribute the disease. The presence of the disease on a number of trees of a single variety and from the same nursery during the first,

second or third year is cause for suspicion that the disease came from the nursery.

The disease can be transmitted from tree to tree and from orchard to orchard, and therefore every diseased tree is, to some extent, a menace to the community. All diseased trees should be cut and burned. Do not drag them through the orchard, for the disease may be communicated to other trees by contact. This work should be carried on as a community movement and as a matter of public welfare; otherwise the work of the individual will be slow and difficult. The disease is not transmitted through the soil and, therefore, new trees can be placed in the same holes from which the diseased ones were removed.

The need for co-operation on the part of both nurserymen and fruit growers in checking and eradicating these diseases is urgent and would result in great benefit to the entire state.

WINTER INJURY. Many trees die prematurely because of winter injury. This is usually due to the removal of the soil so as to leave a hollow space around the base of the tree. The alternate freezing and thawing leaves a small crevice around the tree, permitting the movement of the tree by the wind. The result is both a freezing and breaking of the bark, leaving a most favorable condition for the entrance of organisms causing decay. In severe cases the tree dies during the following summer, but in mild cases it may live for one or two, or possibly three, years. Trees affected in this manner frequently show symptoms similar to yellows.

WIRE INJURY. Failure to remove the label wire frequently causes symptoms similar to yellows.

SPRAY INJURY. The foliage of trees is frequently injured by the use of improper sprays or by the incorrect application of mixtures. Incorrect spraying is frequently worse than no spraying.

Spraying.

In spraying the orchard four points should be kept in mind: (1) The time of application; (2) the material used; (3) the organism to be controlled; and (4) the thoroughness of the treatment.

(1) If the treatment is not given at the proper time the results may be disappointing. The interval of time during which some organisms can be treated successfully may be very short, a few days or even a few hours.

(2) Some materials are better than others, but in all cases the line of treatment must be practical.

(3) Indiscriminate spraying is not profitable. The orchardist should know the object of this treatment. A clear, concise line of treatment for the season is desirable.

(4) The treatment should be thorough in order to be efficient. The dormant spray should hit every part of the tree where the pest is likely to find lodgment. All growing season sprays should be applied as a fine mist and the fruit and foliage should be well coated with small spots of the mixture. It is usually advisable to continue the spraying until the tree begins to drip. In spraying for fungus diseases the trunk and branches should be as thoroughly coated as possible. In spraying for plant lice, pear psylla, red bug and other sucking insects, the treatment must be so thorough that all the individual insects are drenched.

SPRAY CALENDAR FOR PEACH.

This spray calendar has been adopted by T. J. Headlee, Entomologist; M. A. Blake, Horticulturist, and Mel. T. Cook, Plant Pathologist of the New Jersey Agricultural Experiment Station, as being most satisfactory for New Jersey.

Time	Material.	
1. Before the buds swell.	Commercial concentrated lime-sulphur 1 part in 9 parts water, or home-made concentrated lime sulphur diluted to a specific gravity of 1.03.	For leaf curl and San José scale.
2. Just as the husks fall from the small fruit.	Self-boiled lime-sulphur, + 3 lbs. arsenate of lead paste (15% arsenic oxide) to each 50 gallons.	For scab, brown rot and curculio.
3. Three weeks after 2.	Self-boiled lime-sulphur only; no lead arsenate.	For scab and brown rot.
4. Three weeks after 3. This application may be omitted with early varieties ripening before Aug. 1	Self-boiled lime-sulphur.	For scab and brown rot.

Other treatments with self-boiled lime-sulphur may be given on late peaches. In sections of the State where scab and brown rot are not serious, all except the first two of these sprayings may be omitted. When curculio is particularly bad, a spraying of arsenic of lead, 3 lbs. to 50 gallons of water, should be applied soon after the blossoms fall. When plant lice are troublesome a supplementary spray of "black leaf 40," tobacco extract, soap and water should be used; $\frac{3}{4}$ of a pint of "black leaf 40," 3 lbs. soap, and water to make 50 gallons. Mixture must be applied before leaves are curled, and every insect must be hit.

SPRAY CALENDAR FOR PLUM.

This spray calendar has been adopted by T. J. Headlee, Entomologist; M. A. Blake, Horticulturist, and Mel. T. Cook, Plant Pathologist of the New Jersey Agricultural Experiment Station, as being most satisfactory for New Jersey.

- | Time | Material | |
|--|---|---|
| 1. Before the buds swell. | Commercial concentrated lime-sulphur 1 part in 9 parts water, or home-made concentrated lime-sulphur diluted to a specific gravity of 1.03. | For black knot, brown rot and San José scale. |
| 2. Immediately after the petals fall | Self-boiled lime-sulphur, 3 lbs. arsenate of lead paste (not less than 15% arsenic oxide) to each 50 gallons. | For brown rot and curculio. |
| 3. When the fruit is the size of small green peas. | Same as 2. | For curculio and brown rot. |
| 4. Three weeks after 3. | Self-boiled lime-sulphur. | |

Other applications may be given at intervals of two or three weeks, if necessary. If plant lice are troublesome, use $\frac{3}{4}$ pint of "black leaf 40," 3 lbs. soap, and 50 gallons water, well mixed, before the leaves curl. Every insect must be hit to be destroyed.

SPRAY CALENDAR FOR SWEET CHERRY.

This spray calendar has been adopted by T. J. Headlee, Entomologist; M. A. Blake, Horticulturist, and Mel. T. Cook, Plant Pathologist of the New Jersey Agricultural Experiment Station, as being most satisfactory for New Jersey.

- | Time | Material | |
|---|--|--|
| 1. Before the buds swell. | Commercial concentrated lime-sulphur 1 part in 9 parts water, or home-made concentrated diluted to a specific gravity of 1.03. | For scale insects and fungus diseases. |
| 2. Immediately after the petals fall. | Self-boiled lime-sulphur + 3 lbs. arsenate of lead paste (not less than 15% arsenic oxide) to each 50 gallons. | For brown rot, leaf spot, curculio and leaf chewers. |
| 3. When the fruit is the size of small pea. | Same as 2. | Same as 2. |
| 4. After the fruit is picked. | Self-boiled lime-sulphur only. | For leaf spot. |

For sour cherries the first spraying may be omitted. If plant lice are troublesome, use $\frac{3}{4}$ pint of "black leaf 40," 3 lbs. soap, and 50 gallons water, well mixed, before the leaves curl. Every insect must be hit to be destroyed.